21 P.

AEROSPACE RESEARCH APPLICATIONS CENTER
QUARTERLY REPORT
Mid-December, 1963 - Mid-March, 1964

This Quarterly report covers the period December 15, 1963, to March 15, 1964. Highlights of this period of activity included the meeting of member company representatives and other interested persons on January 13. At this meeting reports from company representatives were made by John Schley, Manager of Technical Services, Stellite Division of Union Carbide Corporation; Maurice R. Eastin, President, Esterline Angus Instrument Company; and Arthur DerDerian, Manager of Central Market Planning, Westinghouse Electric Corporation. Copies of the statements by Mr. Schley and Mr. Eastin are attached. (See attached Exhibits A and B). Unfortunately Mr. DerDerian became ill shortly after the meeting and was hospitalized for an extensive time and has not been able as yet to provide a copy of his statement.

At the meeting, announcement was made of the extension of the contract NASr-162 and expansion of the support to $300,000 per year by James Dennison of NASA. Announcement was also made of the next meeting of the Center on April 30. Arrangements have been made for Mr. James E. Webb, the Administrator of the National Aeronautics and Space Administration, to address this meeting.

At the urging of member companies supplemental programs to use various Defense Documentation Center and Atomic Energy Commission materials were undertaken during the quarter. Plans were made for extending these areas of activity.

Information about the Center was provided for a number of interested companies, and various company representatives have been invited to participate in the April 30 meeting.

Information about the Center was also provided for a number of visitors from other universities including Wayne State, the University of Pittsburgh, and the University of New Mexico. The Center assisted the Wayne State program by providing information and retrospective searches as well as making various suggestions to assist the beginning of that operation.

Substantial progress was made in extending the Selective Dissemination Service. By the end of the quarter, 90 interest profiles were in active operation.

A substantial number of member companies indicated their desire to continue membership in the Center after the end of the first year's operations on April 1, and more are expected to do so by the end of the quarter. It appears that all but five or six of the member companies will have made arrangements for extending active membership in the Center into the second year of operations.

Further assistance was provided by the Science Advisory Committee under the chairmanship of Dr. Lynn L. Merritt, Jr.

Arrangements were made to provide the Center with additional space by making available the offices and facilities formerly used by the Geological Survey when this activity was moved to new quarters.

A summary of service activity data is attached. Parts of a report (see attached Exhibit C) prepared by Dr. Arthur M. Weimer, Co-Director of the Center, for the Board of Trustees of the Indiana University Foundation are attached since efforts were made to outline some of the results of the first year of operations. A summary article reviewing various of the activities of the Center during its first year appeared in the April 1964 issue of the Indiana Alumni Magazine. This is also attached. (See attached Exhibit D).

The growth of service activity, particularly the increasing visits to the Center by company R & D people for the purpose of discussing their projects preparatory to working up search requests, and dealing directly with our technical people in building technical profiles, necessitated an increase in technical staff at both the operating and supervisory levels. This increase was initiated in the past quarter, together with reorganization to handle more effectively the increasing company visitors.

Mr. David Cravens was appointed Assistant Director of Operations, under Howard L. Timms, Director of Operations, and Mr. James Hubbell was appointed Supervisor of Systems and Computer Operations. Administrative staff personnel were added to support the line organization.

Staff additions continue to be made as aggregate activity increases through the spread of Center services within member companies. Technical staff at the operating level now totals twelve scientific and technical people whose competence cuts across almost the entire spectrum of scientific and technical disciplines.

SUMMARY OF ARAC ACTIVITIES

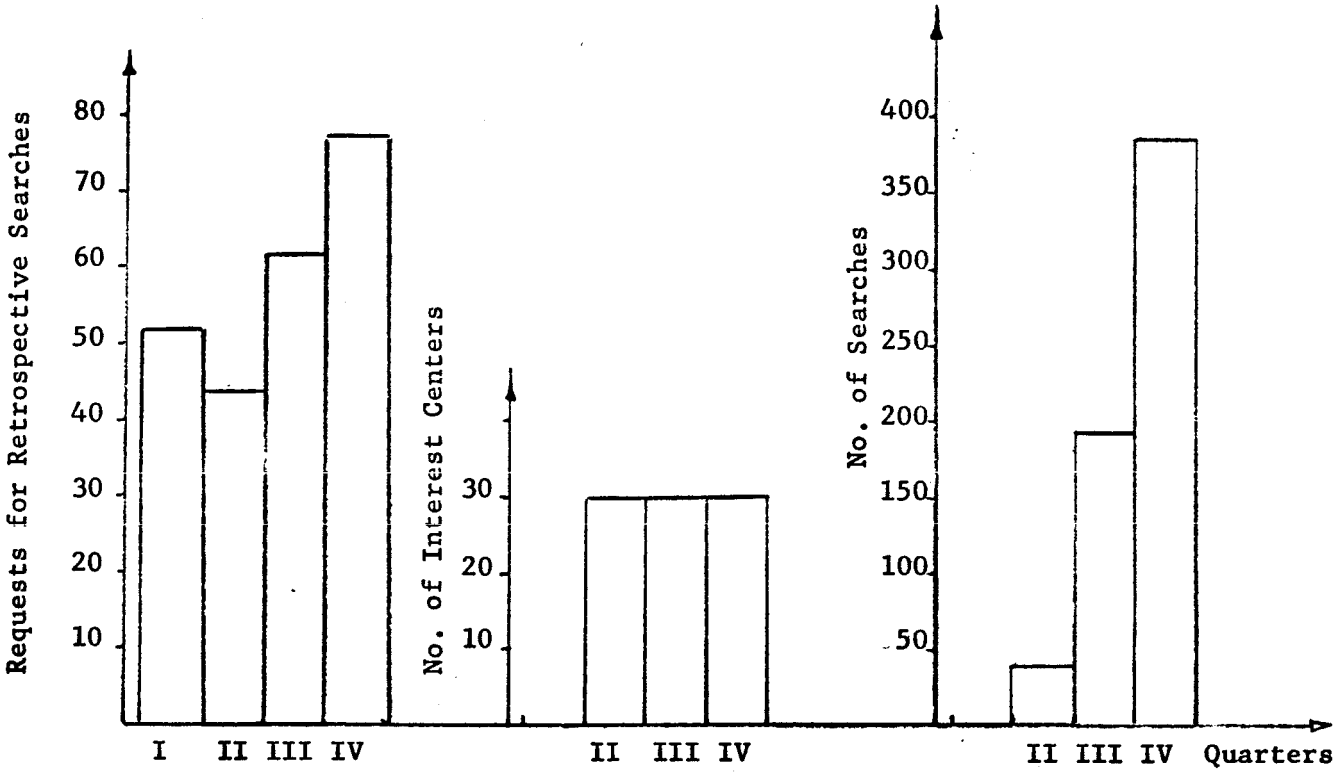
ARAC SERVICE DATA

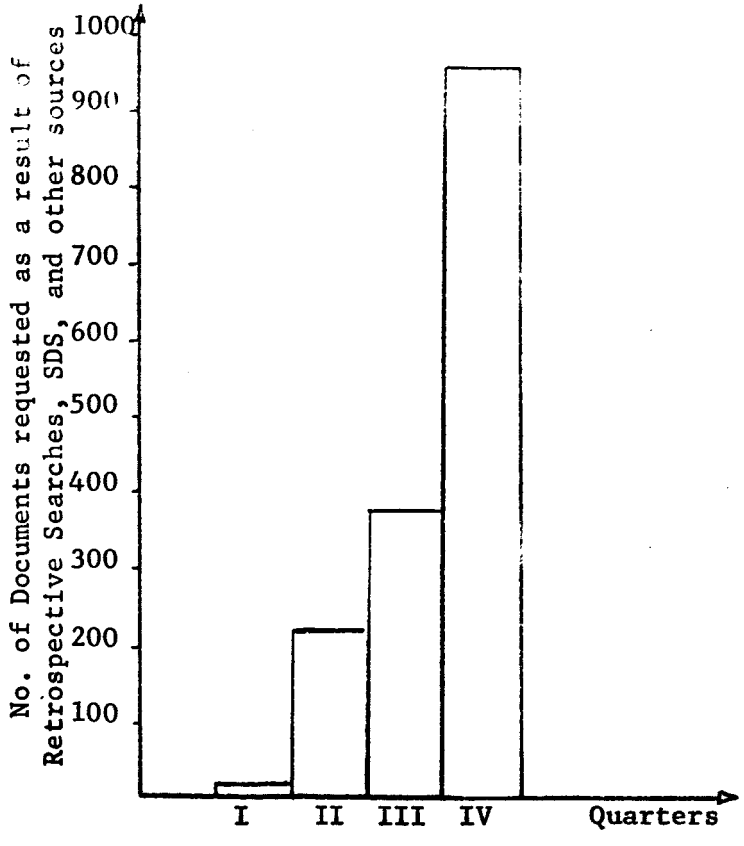
April 1, 1963 - March 31, 1964

	1st Q.	2nd Q.	3rd Q.	4th Q.	TOTAL
RETROSPECTIVE SEARCH SERVICE					
No. of requests for Searches	52	44	62	77	235
SELECTIVE DISSEMINATION SERVICE					
No. of interest centers (profiles) involved		30	30	30	90
No. of Profile Searches (sent once every two weeks)		40	194	387	621
NUMBER OF DOCUMENTS REQUESTED	8	215	376	956	1555
INDUSTRIAL APPLICATIONS SERVICE					
FLASH SHEET SERVICE					
No. of Abstracts sent out	39	94	105	49	287
No. of Co. requests for full information	36	225	454	354	1069
No. of requests for supplementary information	7	5	6	4	22
INDUSTRIAL APPLICATION REPORTS					
No. of Abstracts sent out			4	52	56
No. of Co. requests for full information			10	274	284
ENGINEERING INFORMATION ON CURRENT PROBS.					
No. of Problems handled	8	4	4	0	16
SCIENCE PROGRAMS					
No. of events	5	0	1	2	8
MANAGEMENT PROGRAMS					
No. of events	3	0	1	0	4

RETROSPECTIVE SEARCH SERVICE

SELECTIVE DISSEMINATION SERVICE





INDUSTRIAL APPLICATION SERVICE

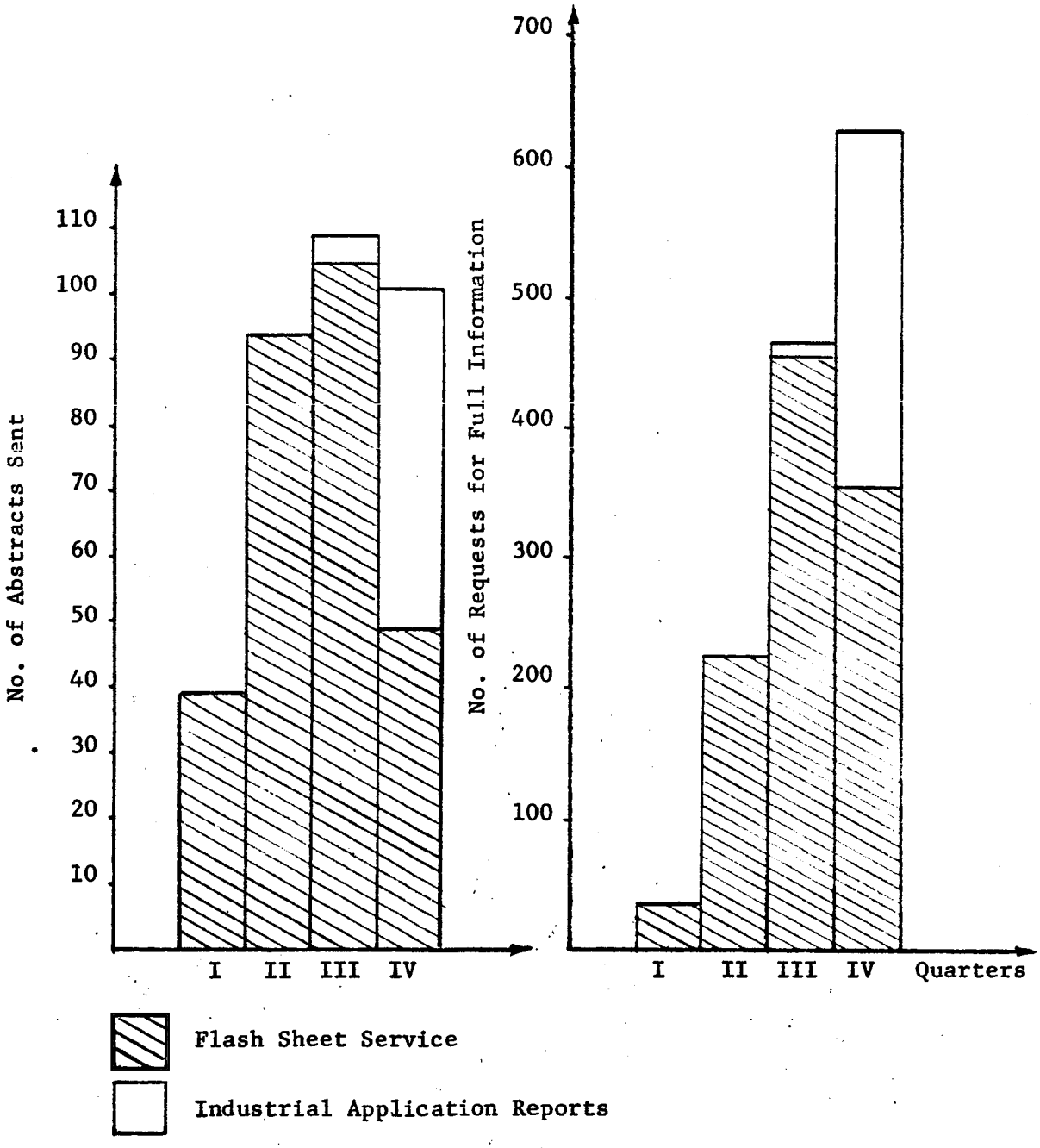


EXHIBIT A

THE USE OF ARAC TECHNOLOGY UTILIZATION SERVICES AT UNION CARBIDE CORPORATION, STELLITE DIVISION*

John R. Schley
Manager, Applications Engineering
Technology Department
Union Carbide Corporation, Stellite Division

I. Introduction

Most people have heard of the Union Carbide Corporation, but relatively few are acquainted with its Stellite Division. Union Carbide is best known as a manufacturer of chemicals and related products, and a major share of the income of the Corporation is derived from the sale of these products. What is less well known is that Union Carbide is also engaged in the business of producing metals in a variety of forms beginning with the mining of the ore and ranging all the way to finished mill products of highly specialized metals and alloys. The Stellite Division is engaged in the manufacture of the latter products.

In order to establish a proper perspective for evaluating Stellite Division's role in the ARAC program, I would like to acquaint you with the Division's products and processes. A major share of our business is related directly or indirectly to the defense effort. We employ approximately 2500 people, and we manufacture metallic materials designed to withstand extreme conditions of heat, corrosion, and/or wear. These materials consist principally of nickel-base, cobalt-base, and

* Presented at the Quarterly Meeting of the Aerospace Research Applications Center, Indiana University, January 13, 1964.

iron-base alloys and the refractory metals columbium, tantalum, tungsten, and their alloys. Metal-ceramic composites are also produced.

One example of the application of our alloys is the outer skin of the Mercury space capsule, which is comprised of one of our nickel-base alloys. Another one of our alloys is used in the giant F-1 rocket engines intended for use in the Saturn rocket. We also produce metals that play vital roles in many of the nuclear power systems under construction or in operation today.

These products are manufactured in the form of wrought and cast articles. The wrought products are marketed in the common mill forms, and castings are produced by conventional sand foundry techniques as well as by the investment-casting process. The aircraft gas turbine engines that powered the jet you last flew in very likely contained wrought and cast components produced by the Stellite Division.

The exceptional properties of these materials necessitate the use of especial fabricating techniques when they are incorporated into applications such as the aforementioned. We therefore are required to possess expert knowledge concerning the forming, machining, and joining of these materials. It is at this stage that ARAC enters the picture, particularly in regard to the continuing program in which we are engaged to develop metallic materials with greater hot and cold strength, heat, wear, and corrosion resistance. We are also concerned with the continued improvement of manufacturing processes for these materials and the adoption of new manufacturing methods and equipment as they are developed.

II. Early Work with ARAC

Our participation in the ARAC program began in March of 1963. We had

considerable contact with ARAC during these early, formative stages through Dr. Howard Timms. During the interim between our entry into the program and the time several months ago at which well-defined services took shape at ARAC, the principal services we utilized were the flash sheet service and the engineering information service on current problems.

I would like to next describe two diverse examples illustrating our use of the engineering information service: Shortly after we entered the program, Dr. Timms paid us a visit to familiarize himself with our personnel, products, and manufacturing processes. At this time, we brought several problems to his attention, one of which dealt with the means for masking selected areas on aircraft turbine blades and vanes to prevent their coating during a high-temperature process intended to apply an oxidation-resistant metallic coating. We had, at that time, achieved only very limited success in masking and were anxious to learn whether any practical and reliable technique had been developed by NASA or elsewhere. Dr. Timms conducted quite an extensive survey of the NASA centers as well as personally contacting individuals associated with universities and industrial firms. Although no suitable masking system was uncovered, this survey clearly indicated the state-of-the-art with regard to masking techniques and convinced us that we should continue on the course we had chosen for our experimental work, which ultimately yielded several successful techniques.

A second problem involved the tensile testing of thin gage (.010-inch thick) sheet. We were furnishing a high-strength, high-temperature alloy to one of our customers for use as the skin of a re-entry vehicle,

and we were experiencing difficulty in getting reproducible tensile strength data during the qualification testing of this material. We suspected that our tensile testing technique or the type of specimen we were employing was at fault, and we contacted ARAC in the hope of gaining some useful information from NASA. The details concerning our contact with ARAC are described in a letter I wrote to Howard Timms and from which I will quote: "I wish to thank you for your assistance in securing information for us from NASA relative to our problem in testing thin gage sheet material. We recently completed our state-of-the-art survey, which consisted of a literature search plus correspondence with various firms or individuals throughout the country known to have experience in testing thin gage sheet. It may interest you to know that the greatest amount of information was gained from the NASA people that we contacted through ARAC. Although we did not expect to gain a great deal of information from our contacts in industry, we were nevertheless surprised to learn of the scarcity of information and experience on this subject. Compared to our industrial contacts, the people of NASA were quite well versed on the subject. We are particularly grateful for the information we received from Bill Brown at Lewis Research Center. I was quite impressed during my conversations with Bill by his knowledge in this area, and he furnished several papers that are quite pertinent.

"One of Bill Brown's recommendations was a change in specimen configuration, which we are currently following up on. He submitted a detailed description of a suggested specimen and cited a machine shop in the Cleveland area that had supplied the Lewis Center with machined

specimens. We are currently having this firm prepare a number of specimens for us."

We are still engaged in this test program, and the specimen suggested by the NASA people has been quite thoroughly tested and found to offer certain advantages over the conventional tensile test specimens we had been using.

III. Present System for Utilizing ARAC Services

Our experience to date with the ARAC services had left me with the impression that there is no single formula for utilizing ARAC services that will insure the maximum benefit to all companies. Each company must carefully analyze its specific needs to determine how it can best take advantage of the various ARAC services and then put forth a serious effort to formulate and place in operation a system that will fulfill these needs. Inevitably, alteration of this system will be required from time to time. In other words, a dedicated individual or group of individuals is required to conceive, implement, and sustain this transfer of information.

A. Selective Dissemination Service

As previously pointed out, we are engaged in a continuing program to develop metals with greater strength and resistance to heat, wear, and corrosion. We are also seeking improved manufacturing and fabricating processes for these materials. In NASA's total spectrum of interests, the materials and process interests of the Stellite Division are only a small, albeit important, facet. In view of this situation, we chose to establish one interest center encompassing the entire Division and having as its focal point the Technology Department. This interest center is

characterized by 12 main descriptors, each having a variety of related terms.

It is essential to the success of this approach that the individuals in the ARAC organization responsible for feeding information to this interest center be well acquainted with the company, its products, and processes. This has been accomplished through indoctrination visits by Howard Timms, Dave Cravens, and Mike Pierce who have met many of our key people, discussed their problems and areas of interest with them, and toured the facilities of the Division.

To date, we have had 43 runs on SDS, and the information thus derived has been disseminated within the Technology Department to appropriate specialists concerned with our products and processes. Although it is too early to render a judgment on this system, we have had a good response from the people receiving the information, particularly since abstracts have been furnished with the references.

We now have the Division's library, located within the Technology Department, handling all receipts from ARAC and transmitting requests for information back to ARAC.

B. Retrospective Search Service

We have had appreciable activity in this area, principally during the past several months. A total of seven bibliographic surveys of NASA generated literature have been conducted for us on such subjects as refractory metals, pyrometry, cryogenic testing of materials, and superconductivity and cryogenic magnetism. I was pleased to note in the last flash sheet mailing that the bibliographic survey conducted for us on superconductivity and cryogenic magnetism is being made available

to all participants in the ARAC program.

Here I feel is a service that everyone is well advised to take advantage of. The only effort required on the part of the recipient is to accurately define his field of interest, and he receives in return a rather comprehensive coverage of all information on this subject that has come to NASA's attention.

C. Industrial Applications (Flash Sheet) Service

In utilizing this service, we depart from the SDS scheme because the flash sheet information is in many cases immediately useful to our Production Departments as well as our Maintenance and Works Engineering Departments. Initially, the flash sheets were scanned and those considered pertinent were routed to certain superintendents in manufacturing areas, but the response to this approach was less than overwhelming.

Recently, an Industrial Engineering Department was created at the Stellite Division. The principal objective of this department is to provide services that will ultimately result in significant reductions in manufacturing costs in each of the three manufacturing plants within the Division. With such a commitment, it is natural that this department would be interested in any innovations that are likely to contribute toward this objective. The flash sheets are now being channeled into this department where they will be assessed for applicability in the manufacturing plants.

IV. Summary

It is only within the past several months that we have developed a really workable system for disseminating information received from ARAC, and this system should mature and bear fruit in 1964. The immediate

benefits that we expect to derive will accrue through the selective dissemination and retrospective search services. While these admittedly are literature survey, or library, services, they are quite useful in that they are performed for and not by the engineer thus freeing him for actual developmental work. One observation I have made with respect to engineers is that generally they are not enthusiastic literature surveyors. This view arises from their protestations that they have no time, when, in most cases, they have little inclination. In spite of this attitude, it is essential that they conduct surveys of the literature in the field in which they plan to undertake a program, prior to initiating this program. It is here that ARAC can render a vital service. As I pointed out previously, we have found the inclusion of abstracts with the literature references to be quite useful. We would also like to see the information sources covered in the SDS surveys broadened beyond the STAR and IAA reports and would particularly like to see Nuclear Science Abstracts included in the survey.

We hope to eventually derive the greatest benefit from the flash sheets. To date, we have not scored on any of the flash sheets but have had several near misses in the Technology Department. We are now making a second pass of the sheets through our Industrial Engineering Department. Admittedly, you are playing the odds with flash sheets, but then you only have to hit one occasionally to make the entire effort worthwhile.

In conclusion, we feel that this transfer of technical information can contribute significantly to the efficiency of operation and to the continuing growth of the Stellite Division, and we wish to commend both NASA and ARAC for their efforts toward this end.

EXHIBIT B

Report on ARAC Conference on Long Range Managerial Planning
Maurice R. Eastin, President
Esterline Angus Instrument Company

I will first report on the ARAC Conference on Long Range Managerial Planning. I will then make a proposal which I trust will be interesting to you but, above all, I hope the proposal will stimulate all of us to make better use of the NASA information and the horsepower of our great educational institutions. Now the report on the areas of general agreement reached at our planning conference.

First, in our system, planning is profit planning and the objective is return on investment. While this may be a shocking and cold blooded statement to those not actively involved in managing an industry, it is not that at all. Return on investment is the indicator or the final filter in technical terms that tells industry whether they have made proper use of all resources and assets. Since we are in a death struggle with other systems and this approach gives us an indicator of how well we are using our resources.

The second area of general agreement was that planning should be done by those who execute the plan. This does not mean that help cannot come from staff people in preparing background material in those companies who are fortunate enough to have such assistance. One of the principle reasons for planners-doing is that a plan should be worn around the neck for daily use in every move a company makes. Management must identify themselves with the plan they are executing.

A third point of general agreement was that a company should know itself - do some self analysis to determine its talents and its position in the market place before it strikes out. As basic as this seems, this is sometimes avoided or forgotten.

Now comes the fourth area of general agreement and one of the great problems of our times. In the fast changing technology of our times, one of the biggest problems is to have available and digested the scientific knowledge on which good decisions can be made. This is where ARAC comes in. Our problem really is as great as the whole educational system. Management must be exposed to the facts - the technology - and it must absorb or reflect these facts and technologies in its plans and actions. The key to the future of many companies stems from the assumptions that are made on technical trends, economic trends, and marketing trends. If we all made the same assumptions we might reach the same conclusions. President Clark Kerr of California calls these times "The Age of the Knowledge Industry." When men and women of all ages will have to be continuously educated through their life time to adjust to the continued technological changes. -- These economic marketing and technological assumptions could very well be termed the promises companies live by - and sometimes die by.

My proposal to this distinguished group is for a change in the approach of ARAC. I propose a new emphasis, I propose that ARAC take on a much bigger job - that of informing management not only of the technical bits and pieces that may fit into their selected narrow categories, but informing management on the structure or framework into which these key developments fit and through round table briefings, say six a year, give industry the whole picture, not just the bits and pieces. I feel that this approach puts not only this NASA information to work more effectively, but teams it up with the great store of knowledge of the complex of Indiana University and our whole educational system. Using President Stahr's words, we want to apply the "trained intelligence" of Indiana University "to work at the frontiers of human experience."

For example, I would propose great decisions lectures or round tables from the management point of view (and I emphasize this point of view) on such subjects as gas chromatography, mass spectrometry, analog computers, digital computers, new metals and alloys, new plastics, hydro forming (and I insert hydroforming to show that all of these subjects need not be glamorous but they may nevertheless affect the future of industry). These round tables would put the NASA developments and all the known developments in the technology into a structure into which the marketing, the economic, and the technological horsepower of Indiana University, plus the information from NASA and all the known technology can be put to work effectively. These round tables would place these revelations (electronic-protons in an atomic structure) in their proper structure not treat them as lonely facts. And the facts would appear as building blocks to build the shape of things to come.

There are available to the uncommitted student all of these great technologies in great detail, but the people who make decisions - affecting the future of industry and, yes, our country, do not readily have available to them the discussions of the technologies from the management point of view on which assumptions and actions must be made now for results many years hence. Yes, we could all go back to school but, unfortunately, time and our boards of directors would not permit it; so we must use the great educational institutions such as I. U. to fit these pieces of information together to give us the total picture and the reasonable assumptions for the future. The function of ARAC in the practical total analysis of technology for decision making, call it pat or tat tad, can be explained in rural terms as taking the horse to water - whether industry drinks or not, is not NASA's, ARAC's or Indiana's responsibility but it is the hope of America that they will. Exposing industry to these structures is the responsibility of our great universities and our great agencies of government such as NASA. I formally propose the scheduling of six round tables a year with a limited selected few participating at the round table, in the pit so to speak, but with listeners in the arena only limited by the space available. This would make it possible to bring more members of our organizations in to expose them directly to the information that managers must have to use to exploit the resources of their company.

If we were all exposed to the same total picture with the economic, market, and technical assumptions properly made, we would all make better

decisions for the future of industry and the total resources of our great country would be put to work more effectively.

I formally make this as a proposal to ARAC, to NASA, and to Indiana University with the hope that if in its proposed form it may not be acceptable, it will nevertheless stimulate us to take a look at the big picture and not just the bits and pieces. We are dedicated at Esterline Angus to meeting the challenge of planning in this "age of the knowledge industry." Thank you.

EXHIBIT C

ARAC PROGRESS REPORT
(as of March 1, 1964)

Arthur M. Weimer, Co-Director

Aerospace Research Applications Center

We have attempted to learn as much as we can about the processes of technology utilization and transfer. Here are some of the things I believe we have learned--

First, we learned at an early stage that we need the wholehearted support of top management in order to make the technology transfer and utilization process work. Where we have enjoyed such wholehearted support from top management our programs within member companies have invariably been successful.

Second, we have learned that much depends on the internal arrangements made by member companies for handling the materials and for making the most effective use of them. Where the assignments are handled "in addition to other duties" the results are sometimes disappointing. Where specific responsibility is assigned and where the program is given a chance to demonstrate its potential and to flower, the results have been generally favorable. There are always problems, of course, of rivalries between people in companies, and it is always possible that a good program will be disturbed by such rivalries and may suffer as a result. For the most part, we have been fortunate in this respect.

Third, we have learned that there is no single method that is most effective in the process of transferring and utilizing this new information. We have had good success with the flash sheets; we have had excellent success with the utilization of library materials, both in terms of retrospective searches to come up with answers to specific problems and questions and with the Selective Dissemination Service to assure each company that its current interests will be served quickly and effectively by referring to them the new materials every two weeks as they become available.

As a non-technical person I have been most impressed with the Selective Dissemination Service, and I think this holds true for most of our staff. While this type of service has been developed elsewhere also, and we cannot claim that it was invented here, its adaptations to our purposes and to the needs and requirements of our member companies will be substantial additions to knowledge in this field. Dr. Timms sparked the early work in this area and in cooperation with Mr. Raber, Mr. Cravens, and Mr. Hubbell along with Dr. Martin and his assistants at the Computer Center, brought us substantial progress in this very interesting area.

We have been able to respond to requests for quick information on current problems wherein we put NASA scientists and engineers in direct contact with company people. But we have tried to keep this type of activity under some control since it is only in the exceptional case that NASA people should be called upon for this type of service. We have made only limited progress so far with the utilization of scientific panels and with the development of managerial programs. We hope that more will be done along these lines in the months ahead. Of special interest recently was the panel on smoking which was convened at the request of Mead Johnson and Company. This proved to be very interesting and may be a highly useful panel.

Fourth, we have learned that much depends on the development of confidence and respect among the various members of this complex enterprise. The NASA people have come to have confidence in us and to respect our abilities and judgment. Similarly the representatives of the member companies have developed a feeling that the personnel of the center could be trusted, and that they could keep confidences in regard to company needs and maintain secrecy where secrecy had to be maintained, and that the members of the Center would do everything possible to further the objectives of the companies. In turn, the various members of the Center from Dr. Wells to part time student employees have developed confidence in both NASA and company representatives. We will need to extend this type of operating relationship as we move into more work with the DOD, The Atomic Energy Commission and new member companies.

Fifth, we are convinced that the work of our Center can contribute significantly to the economic growth of the state and the region. The contributions of the Center are most likely to become effective over a period of time rather than within a short span of time. Even so, we feel that a number of member companies have already derived benefits that will help their competitive position, and in some cases have started them toward even more significant programs of expansion.

We would not concede for a moment that the Midwestern region is lacking in R & D capability. We believe, however, that there is an excellent chance that the Midwest may very soon, if indeed it has not already, attain a position of preeminence in technology utilization and in mastering the processes and techniques necessary for applying quickly and rapidly the results of R & D efforts. This may be one of our greatest chances for more rapid economic growth in the future.

EXHIBIT D

FIRST ANNIVERSARY!

INDIANA ALUMNI MAGAZINE
April, 1964

"Is the baby legitimite?"

This question was posed by George L. Simpson, Jr., associate deputy administrator of the National Aeronautics and Space Administration (NASA), shortly after the "baby" was born about a year ago at the University.

The "baby" he referred to was the experimental Aerospace Research Applications Center (ARAC) founded by NASA through an initial $150,000 grant to the I.U. Foundation, and given additional financial support throughout the rest of 1963 by "membership fees" from 29 participating companies.

The vision of ARAC is to speed up the transfer of usable space technology to private industry; in this case, to the 29 member companies "gambling" on the outcome of the experiment.

NASA may have indirectly settled the legitimacy question in January when Dr. Simpson informed NASA's two partners in the venture--the University and industry--that "Indiana University's approach to the task of converting the fruits of space research to civilian uses is one of the most promising and helpful, and NASA expects to stick with it."

And to add convincing weight to his words, the NASA official announced 1964 plans that included doubling the initial grant to Indiana to $300,000.

Member companies certainly are enthusiastic about the "baby's" chances to mature. Declared Albert G. Bill, technical director for electronic systems, Arvin Industries of Columbis, "My mouth waters to see the amount of good technology handed to you through the reports."

He went on to note that Arvin's Westgate Laboratory has come up with a product the firm hopes to market within a year; and a technique that solved an instrumentation design problem.

"It has been our first dependable source of NASA material," said Ovid Baker, economics associate with Socony Mobil Oil Co., New York. He predicted a significant breakthrough in information handling, and added: "The ARAC experiment is a prototype of this future information system."

R. J. Piros, president of New Castle Products, Inc., had particular praise for the engineering services of ARAC. "In one instance, we were searching for a source of helium with an oxygen content of less than one part per million. We contacted the normal commercial sources and they could not tell us the exact purity of their product. We then contacted ARAC...and had a reply within two days.

"We also have under study with ARAC a product possibility which has considerable potential, and heretofore unavailable consumer benefits."

K. L. DeBrosse, manager of the Space and Physical Sciences Division, International Telephone & Telegraph Corp. in Fort Wayne, Ind., added: "One of the greatest benefits to us has been the cultivation of a fertile common University-industry environment as a basis for future relationships."

Probably the most enthusiastic of all is the University, where the word for 1964 is "Go! Go! Go!"

Part of the plan to "expand, refine and improve operations" during the year is the opening of the center to new companies, which includes a special $2,500 fee for those employing fewer than 500 workers. This special fee, designed to encourage members from industries of varied sizes and product lines, is half that for the larger companies, according to Chancellor Herman B Wells, president of the sponsoring University Foundation.

"This is not a closed operation," added Arthur M. Weimer, ARAC co-director. "We want new companies coming into the program to continue the experement to see if it works with a broad, general group of firms as well as with a selective group."

In addition to more member participation, new sources of information will be added. "Arrangements already have been completed to permit access to all unclassified materials of the U.S. Department of Defense, and negotiations are underway to bring similar materials of the Atomic Energy Commission into the center," reports Howard L. Timms, director of operations.

The ARAC Library, now housing some 50,000 items, will be augmented by 80,000 the operations director reported.

Elvis J. Stahr, president of the University, commenting on the NASA contract renewal, said: "Considering that this started as a new idea and an unprecedented venture, this first year has brought highly gratifying results.

"This is, after all, a cooperative venture which joins the business community, NASA and the University. We look forward enthusiastically to a year of even greater progress in this pioneering and truly dramatic undertaking."

Six basic services now are offered ARAC member companies:

Retrospective search service--in which the entire library of unclassified reference materials compiled by the National Aeronautics and Space Administration is searched for document titles relevant to a company request.

Selective dissemination service--providing each member company with biweekly notification of all new library titles.

NASA tech brief service--abstractions of flash sheets, containing reports from all NASA regional centers on product and process innovations;

complete flash sheet information sent upon request.

Engineering information service--matching current, unpublished NASA research findings to company technical problems.

Science programs--allowing University scientists to render continuing, and on occasion, special service to member companies.

Management programs--for long-range management planning, and research and development management.

Summarizing the first months of service to industry, Dean Weimer noted that "reports from member companies indicate a great deal has been learned about technology utilization, and about improving and accelerating the process. Even more will be learned in the year ahead if company expectations are correct."